



ALJABAR LINEAR

APLIKASI ALJABAR LINEAR

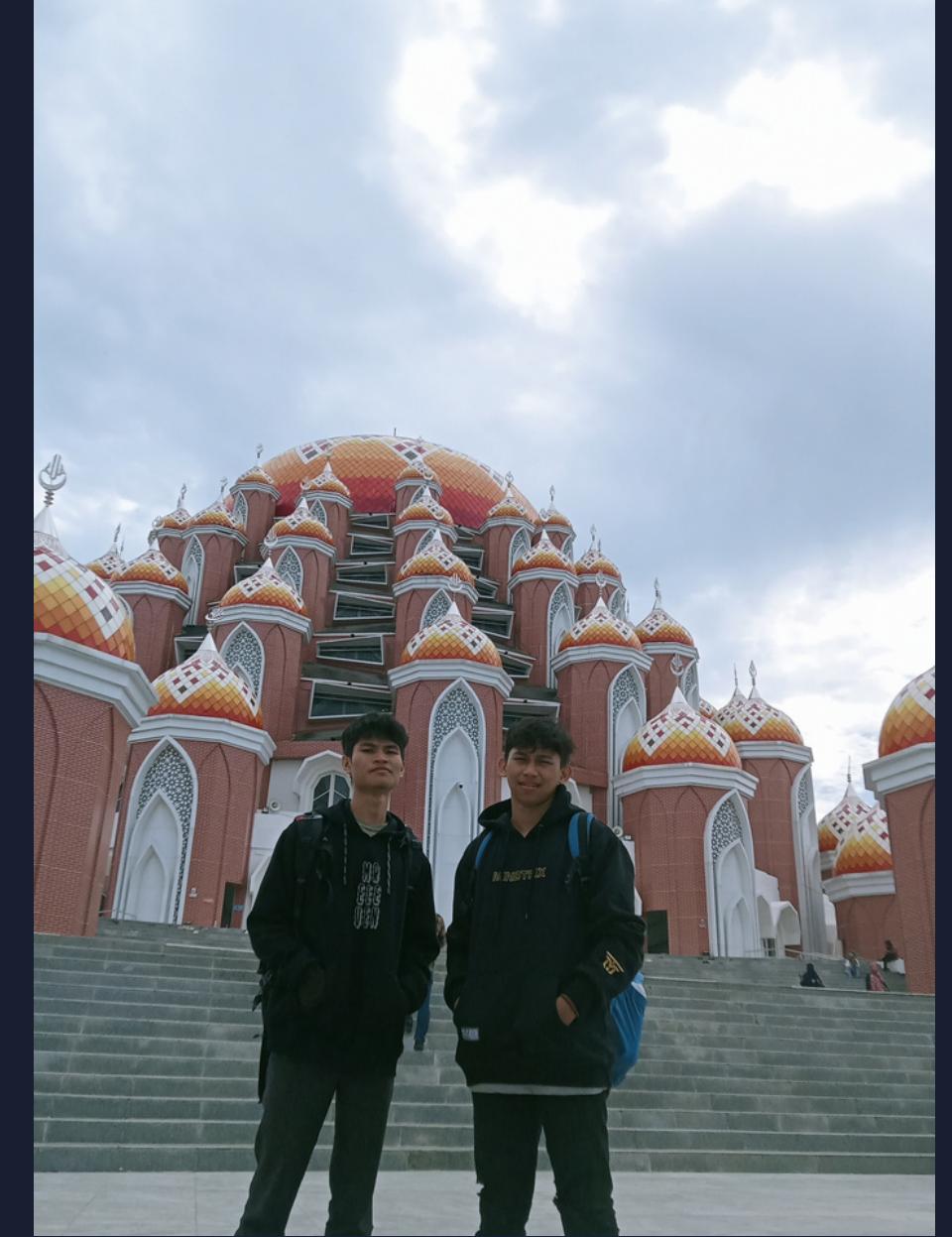
DOSEN : NURUL FUADY ADHALIA S.SI,M.SI



SAMPEL CITRA



PENGAPLIKASIAN ALJABAR LINEAR



METODE 1

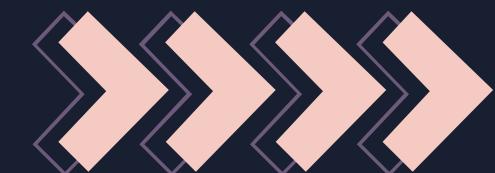
LIGHTNESS

Lightness adalah metode konversi RGB dengan menggunakan sistem mencari nilai tertinggi dari matrix RGB kemudian menjumlahkan dengan nilai terendah dari matrix RGB dan membagi 2 dari hasil penjumlahan nilai max dan min RGB.

Secara matematis dapat ditulis sebagai berikut

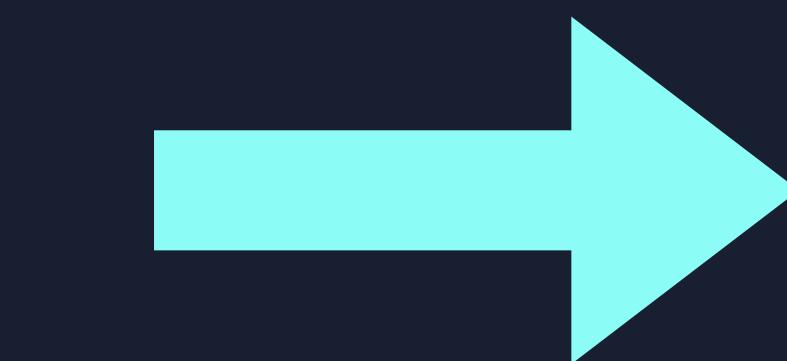
$$(\text{Max}(R,G,B)) + (\text{Min}(R,G,B)) / 2$$

Matrix Lightness



```
[[[147 143 132]
 [147 143 132]
 [147 143 132]
 ...
 [176 172 161]
 [176 172 161]
 [176 172 161]]]
```

```
[[[147 143 132]
 [147 143 132]
 [147 143 132]
 ...]
```



Mengapa Berbeda?

```
[[[139 139 139]
 [139 139 139]
 [139 139 139]
 ...
 [168 168 168]
 [168 168 168]
 [168 168 168]]]
```

```
[[[139 139 139]
 [139 139 139]
 [139 139 139]]]
```

MENGAPA MATRIX YANG DIHASILKAN BERBEDA?

KARENA TERJADI OPERASI MATEMATIS YAITU NILAI MAX DARI RGB DAN MIN RGB DIJUMLAHKAN KEMUDIAN DIBAGI 2

```
[[[147 143 132]
 [147 143 132]
 [147 143 132]]]
```

NILAI MIN RGB = 132

NILAI MAX RGB = 147

$$(132 + 147)/2 = 139$$

MAKA SELURUH BARIS PADA MATRIX ITU AKAN BERISI ENTRY 139

R	G	B
[147 143 132]	[147 143 132]	[147 143 132]



R	G	B
[139 139 139]	[139 139 139]	[139 139 139]

MENGAPA SEMUA ENTRY PADA MATRIX LIGHTNESSINI BERBEDA (TIDAK SAMA DENGAN MATRIX SEBELUMNYA YANG ENTRY SEMUA MATRIXNYA SAMA)?

R G B

[96	96	96]
[96	96	96]
[98	98	98]

MATRIX LIGHTNESS KE-4032

KARENA DENGAN METODE LIGHTNESS OPERASI MATEMATIS DILAKUKAN SECARA BARIS PER BARIS SEBAGAI PENJELASAN :

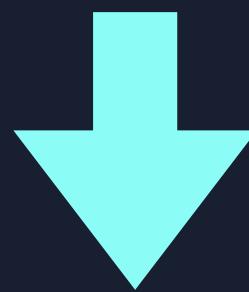
$\begin{bmatrix} [147 & 143 & 132] \\ [147 & 143 & 132] \\ [147 & 143 & 132] \end{bmatrix}$

Karena semua entrynya
sama maka matrix
yang dihasilkan akan
bernilai sama

$\begin{bmatrix} [139 & 139 & 139] \\ [139 & 139 & 139] \\ [139 & 139 & 139] \end{bmatrix}$

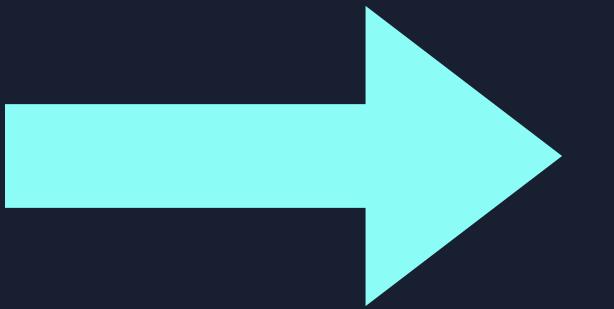
Berbeda dengan matrix
ke 4032 entry pada
kolom ke 3 berbeda
dengan entry 1 & 2

$\begin{bmatrix} [140 & 83 & 53] \\ [140 & 83 & 53] \\ [142 & 85 & 55] \end{bmatrix}$



$\begin{bmatrix} [96 & 96 & 96] \\ [96 & 96 & 96] \\ [98 & 98 & 98] \end{bmatrix}$

SEBELUM DI KONVERSI



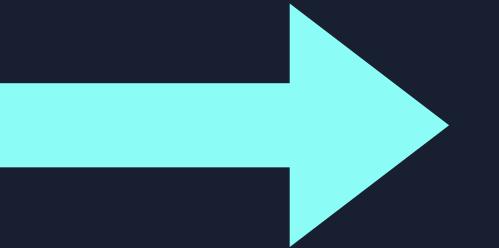
SETELAH DI KONVERSI



```
[[[190 210 234]
 [188 208 232]
 [188 208 232]
 ...
 [192 208 233]
 [192 208 233]
 [193 209 234]]]

[[189 209 233]
 [188 208 232]
 [188 208 232]
 ...
 [192 208 233]
 [192 208 233]
 [192 208 233]]]

[[189 209 233]
 [188 208 232]
 [188 208 232]
 ...
 [193 209 234]
 [193 209 234]
 [193 209 234]]]
```



```
[[[212 212 212]
 [210 210 210]
 [210 210 210]
 ...
 [212 212 212]
 [212 212 212]
 [213 213 213]]]

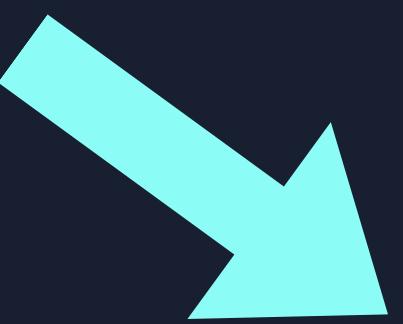
[[211 211 211]
 [210 210 210]
 [210 210 210]
 ...
 [212 212 212]
 [212 212 212]
 [212 212 212]]]

[[211 211 211]
 [210 210 210]
 [210 210 210]
 ...
 [213 213 213]
 [213 213 213]
 [213 213 213]]]

...
```

MATRIKS
LIGHTNESS

MATRIKS GAMBAR



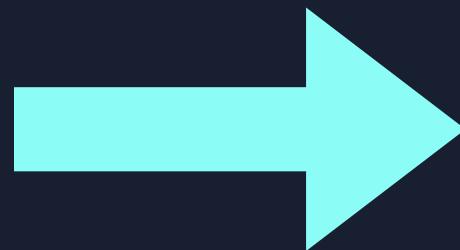
CITRA 1 METODE LIGHTNESS

PRESENTASI PEMASARAN DIGITAL

KARENA DENGAN METODE LIGHTNESS OPERASI MATEMATIS DILAKUKAN SECARA BARIS PER BARIS SEBAGAI PENJELASAN :

[[[190	210	234]
[188	208	232]	
[188	208	232]	

MATRIKS KE-1 DARI GAMBAR



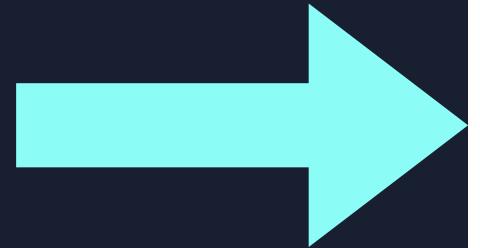
[[[212	212	212]
[210	210	210]	
[210	210	210]	

MATRIKS LIGHTNESS

METODE LIGHTNESS(MIN(RGB)+MAX(RGB))/2
JADI PERHITUNGAN MATRIKS BARIS KE-1 YAITU
 $(190+234)/2=212$

MATEMATIS SETIAP METODE LIGHTNESS
DILAKUKAN SECARA BARIS PER BARIS

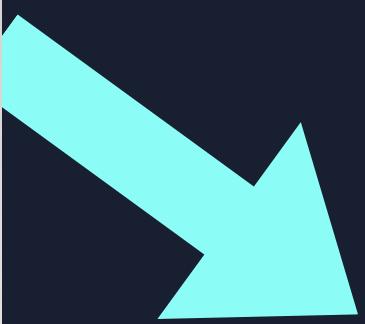
```
[[[200 206 204]
 [200 206 204]
 [200 206 204]
 ...
 [224 225 227]
 [224 225 227]
 [224 225 227]]]
```



```
[[[203 203 203]
 [203 203 203]
 [203 203 203]
 ...
 [225 225 225]
 [225 225 225]
 [225 225 225]]]
```

LIGHTNESS

MATRIKS GAMBAR



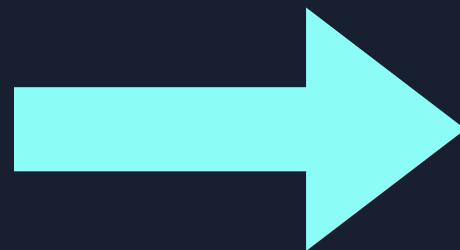
PRESNETASI PEMASARAN DIGITAL

CITRA 1 METODE LIGHTNESS

KARENA DENGAN METODE LIGHTNESS OPERASI MATEMATIS DILAKUKAN SECARA BARIS PER BARIS SEBAGAI PENJELASAN :

[[[200	206	204]
[200	206	204]		
[200	206	204]		

MATRIKS KE-1 DARI GAMBAR



[[[203	203	203]
[203	203	203]		
[203	203	203]		

MATRIKS LIGHTNESS

METODE LIGHTNESS
(NILAI MIN RGB + NILAI MAX RGB)/2
 $(200+206)/2 = 203$

MATEMATIS SETIAP METODE LIGHTNESS DILAKUKAN SECARA BARIS PER BARIS

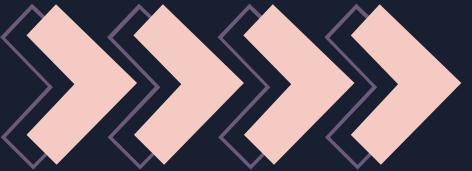
METODE 2

AVERAGE

Average adalah metode konversi RGB dengan menggunakan sistem menjumlahkan seluruh nilai RGB pada matrix-i kemudia dikalikan 1/3.

Secara matematis dapat ditulis sebagai berikut

$$(R+G+B) \times 1/3$$

Matrix Average 

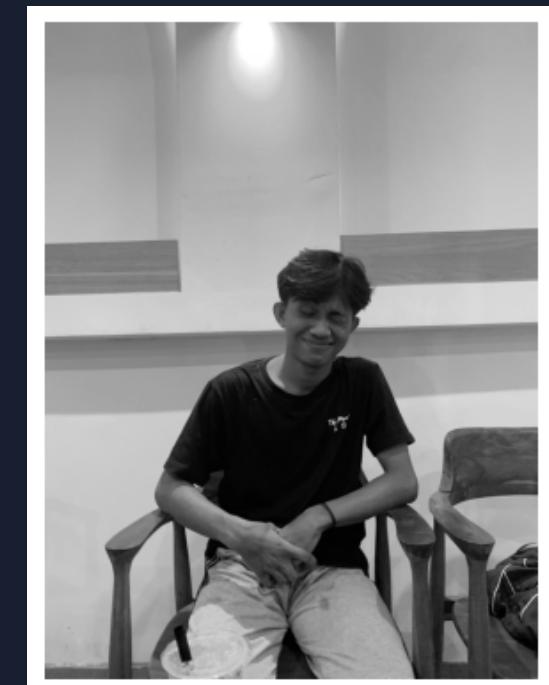
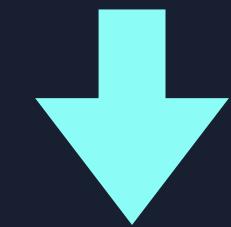
MATRIX AWAL

```
[[147 143 132]
 [147 143 132]
 [147 143 132]
 ...
 [176 172 161]
 [176 172 161]
 [176 172 161]]
```

MATRIX AVERAGE

```
[[147 143 132]
 [147 143 132]
 [147 143 132]
 ...
 [176 172 161]
 [176 172 161]
 [176 172 161]]
```

```
[[147 143 132]
 [147 143 132]
 [147 143 132]
 ...
 [176 172 161]
 [176 172 161]
 [176 172 161]]
```



Secara Matematis :

```
[[[147 143 132]
 [147 143 132]
 [147 143 132]]]
```



```
[140.66666667 140.66666667 140.66666667 ... 169.66666667 169.66666667
 169.66666667]
[140.66666667 140.66666667 140.66666667 ... 169.66666667 169.66666667
 169.66666667]
[140.66666667 140.66666667 140.66666667 ... 169.66666667 169.66666667
 169.66666667]
```

$$\frac{147 + 143 + 132}{3} = 140,6667$$

Pada Average matrix dioperasikan
baris per baris

AVERAGE

```
[[[190 210 234]  
[188 208 232]  
[188 208 232]  
...  
[192 208 233]  
[192 208 233]  
[193 209 234]]
```

```
[[189 209 233]  
[188 208 232]  
[188 208 232]  
...  
[192 208 233]  
[192 208 233]  
[192 208 233]]
```

```
[[189 209 233]  
[188 208 232]  
[188 208 232]  
...  
[193 209 234]  
[193 209 234]  
[193 209 234]]
```

```
...
```

```
[[211.33333333 209.33333333 209.33333333 ... 211.  
212. ]]  
[[210.33333333 209.33333333 209.33333333 ... 211.  
211. ]]  
[[210.33333333 209.33333333 209.33333333 ... 212.  
212. ]]  
...  
[[143.33333333 142.33333333 143.33333333 ... 145.  
144. ]]  
[[145.33333333 143.33333333 144.33333333 ... 146.  
145. ]]  
[[142.33333333 143.33333333 146.33333333 ... 145.  
144. ]]
```



Secara Matematis :

```
[[[190 210 234]
 [188 208 232]
 [188 208 232]]]
```



```
[[211.33333333 209.33333333 209.33333333 ...]]
```

$$\frac{190 + 210 + 234}{3} = 211,333..$$
$$\frac{188 + 208 + 232}{3} = 209,333..$$

Pada Average matrix dioperasikan
baris per baris dan matriks yang
tadinya 3 dimensi menjadi 2 dimensi

AVERAGE

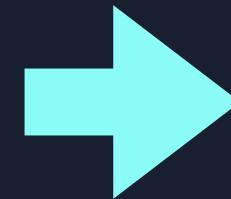
```
[[[200 206 204]
 [200 206 204]
 [200 206 204]
 ...
 [224 225 227]
 [224 225 227]
 [224 225 227]]]
```



```
[[200 206 204]
 [200 206 204]
 [200 206 204]
 ...
 [224 225 227]
 [224 225 227]
 [224 225 227]]]
```



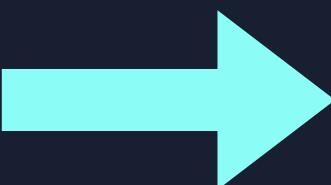
HASIL DARI METODE AVERAGE:



```
[[203.33333333 203.33333333 203.33333333 ... 225.33333333 225.33333333
 225.33333333]
[203.33333333 203.33333333 203.33333333 ... 225.33333333 225.33333333
 225.33333333]
[203.33333333 203.33333333 203.33333333 ... 225.33333333 225.33333333
 225.33333333]
...
[212.          212.          212.          ... 220.66666667 220.66666667
 220.66666667]
[212.          212.          212.          ... 220.66666667 220.66666667
 220.66666667]
[212.          212.          212.          ... 220.66666667 220.66666667
 220.66666667]]
```

Secara Matematis :

$$\begin{bmatrix} [[200 \ 206 \ 204] \\ [200 \ 206 \ 204] \\ [200 \ 206 \ 204]] \end{bmatrix}$$



$$\begin{bmatrix} [[203,333 \ 33333333]] \end{bmatrix}$$

$$\frac{200+206+204}{3} = 203,333$$

Pada Average matrix dioperasikan
baris per baris

METODE 3 LUMINOSITY

mengalikan setiap nilai R, G, dan B dengan konstanta tertentu yang sudah ditetapkan nilainya, kemudian hasil perkalian seluruh nilai R, G, B dijumlahkan satu sama lain. Rumus matematisnya adalah:

$$\text{Cara 1} = (0.299 \times R) + (0.587 \times G) + (0.114 \times B)$$

$$\text{Cara 2} = (0.2126 \times R) + (0.7152 \times G) + (0.0722 \times B)$$

Matrix Lumonisty ➤➤➤➤

HASIL MATRIX MENGGUNAKAN CARA 1

```
[[142.942 142.942 142.942 ... 171.942 171.942 171.942]
 [142.942 142.942 142.942 ... 171.942 171.942 171.942]
 [142.942 142.942 142.942 ... 171.942 171.942 171.942]
 ...
 [ 90.238  90.238  88.238 ...  98.623  96.993  95.993]
 [ 89.238  88.238  87.238 ...  96.623  96.623  96.623]
 [ 87.238  87.238  86.238 ...  96.623  96.623  98.623]]
```

HASIL MATRIX MENGGUNAKAN CARA 2

```
[[143.0562 143.0562 143.0562 ... 172.0562 172.0562 172.0562]
 [143.0562 143.0562 143.0562 ... 172.0562 172.0562 172.0562]
 [143.0562 143.0562 143.0562 ... 172.0562 172.0562 172.0562]
 ...
 [ 91.0184  91.0184  89.0184 ...  94.9522  93.233   92.233 ]
 [ 90.0184  89.0184  88.0184 ...  92.9522  92.9522  92.9522]
 [ 88.0184  88.0184  87.0184 ...  92.9522  92.9522  94.9522]]
```

CARA 1

MATRIX SAMPEL KE-1

```
[147 143 132]  
[147 143 132]  
[147 143 132]
```

$$\begin{aligned}\text{CARA 1} &= (0.299 \times 147) + (0.587 \times 143) + (0.114 \times 132) \\ &= (43,953) + (83,941) + (15,048) \\ &= (142,942)\end{aligned}$$



```
[[142.942 142.942 142.942  
 [142.942 142.942 142.942  
 [142.942 142.942 142.942
```

CARA 2

MATRIX SAMPEL KE-1

```
[147 143 132]
[147 143 132]
[147 143 132]
```

$$\begin{aligned}\text{CARA 2} &= (0.2126 \times 147) + (0.7152 \times 143) + (0.0722 \times 132) \\ &= (43,953) + (83,941) + (15,048) \\ &= (142,942)\end{aligned}$$



```
[[143.0562 143.0562 143.0562
  [143.0562 143.0562 143.0562
  [143.0562 143.0562 143.0562
```

HASIL MATRIX MENGGUNAKAN CARA 1

```
[[206.756 204.756 204.756 ... 206.066 206.066 207.066]
 [205.756 204.756 204.756 ... 206.066 206.066 206.066]
 [205.756 204.756 204.756 ... 207.066 207.066 207.066]
 ...
 [142.107 141.107 142.107 ... 144.836 144.836 143.836]
 [144.107 142.107 143.107 ... 145.836 144.836 144.836]
 [141.107 142.107 145.107 ... 144.836 144.836 143.836]]
```

HASIL MATRIX MENGGUNAKAN CARA 2

```
[[207.4808 205.4808 205.4808 ... 206.4034 206.4034 207.4034]
 [206.4808 205.4808 205.4808 ... 206.4034 206.4034 206.4034]
 [206.4808 205.4808 205.4808 ... 207.4034 207.4034 207.4034]
 ...
 [142.592 141.592 142.592 ... 145.4436 145.4436 144.4436]
 [144.592 142.592 143.592 ... 146.4436 145.4436 145.4436]
 [141.592 142.592 145.592 ... 145.4436 145.4436 144.4436]]
 [[207.4808 206.4808 206.4808 ... 142.592 144.592 141.592 ]
 [205.4808 205.4808 205.4808 ... 141.592 142.592 142.592 ]
 [205.4808 205.4808 205.4808 ... 142.592 143.592 145.592 ]
 ...
 [206.4034 206.4034 207.4034 ... 145.4436 146.4436 145.4436]
 [206.4034 206.4034 207.4034 ... 145.4436 145.4436 145.4436]
 [207.4034 206.4034 207.4034 ... 144.4436 145.4436 144.4436]]]
```

CARA 1

MATRIX SAMPEL KE-1

[190	210	234]
[188	208	232]
[188	208	232]

$$\begin{aligned} \text{CARA 1} &= (0.299 \times 190) + (0.587 \times 210) + (0.114 \times 234) \\ &= (206,756) \\ &= (0.299 \times 188) + (0.587 \times 208) + (0.114 \times 232) \\ &= (204,756) \end{aligned}$$



[[206.756 204.756 204.756

PERHATIKAN OUTPUT DARI MATRIKS SAMPEL KE 1 PADA GAMBAR DI ATAS
OUTPUTNYA MELIPUTI (206.756),(204.756), DAN (204.756).
CARA PEMBACAAN MATRIKS DILAKUKAN PERBARIS(KIRI KE KANAN)

CARA 2

MATRIX SAMPEL KE-1

[190	210	234]
[188	208	232]
[188	208	232]



$$\begin{aligned} \text{CARA 2} &= (0.2126 \times 190) + (0.7152 \times 210) + (0.0722 \times 234) \\ &= (207,4808) \\ &= (0.2126 \times 188) + (0.7152 \times 208) + (0.0722 \times 232) \\ &= (205,4808) \end{aligned}$$

[[207.4808 205.4808 205.4808 .

HASIL MATRIX MENGGUNAKAN CARA 1

```
[[204.58 204.58 204.58 ... 224.9318 224.9318 224.9318]
 [204.58 204.58 204.58 ... 224.9318 224.9318 224.9318]
 [204.58 204.58 204.58 ... 224.9318 224.9318 224.9318]
 ...
 [213.9066 213.9066 213.9066 ... 221.0682 221.0682 221.0682]
 [213.9066 213.9066 213.9066 ... 221.0682 221.0682 221.0682]
 [213.9066 213.9066 213.9066 ... 221.0682 221.0682 221.0682]]
```

HASIL MATRIX MENGGUNAKAN CARA 2

```
[[183.0476 183.0476 183.0476 ... 201.6388 201.6388 201.6388]
 [183.0476 183.0476 183.0476 ... 201.6388 201.6388 201.6388]
 [183.0476 183.0476 183.0476 ... 201.6388 201.6388 201.6388]
 ...
 [193.4128 193.4128 193.4128 ... 198.6016 198.6016 198.6016]
 [193.4128 193.4128 193.4128 ... 198.6016 198.6016 198.6016]
 [193.4128 193.4128 193.4128 ... 198.6016 198.6016 198.6016]]
```

CARA 1

MATRIX SAMPEL KE-1

```
[[200 206 204]
 [200 206 204]
 [200 206 204]]
```

$$\begin{aligned}\text{CARA } 1' &= (0.2126 \times 200) + (0.7152 \times 206) + (0.0722 \times 204) \\ &= (42,52) + (147,3312) + (14,7288) \\ &= (204,58)\end{aligned}$$



[[204.58]	204.58	204.58
204.58	204.58	204.58
204.58	204.58	204.58

CARA 2

MATRIX SAMPEL KE-1

```
[[200 206 204]
 [200 206 204]
 [200 206 204]]
```

$$\begin{aligned}\text{CARA 2} &= (0.299 \times 200) + (0.587 \times 206) + (0.114 \times 204) \\ &= (59,8) + (120,922) + (23,256) \\ &= (203,978)\end{aligned}$$



```
[[203.978 203.978 203.978]
 [203.978 203.978 203.978]
 [203.978 203.978 203.978]]
```

HASIL GAMBAR



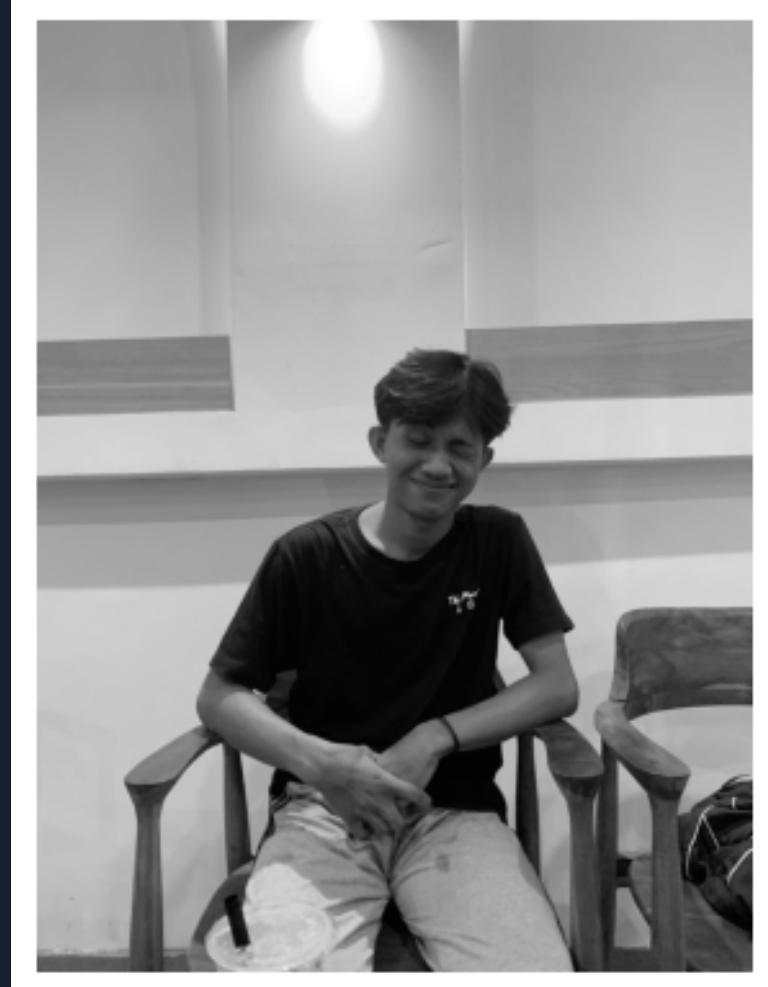
METODE
WEIGHTED AVERAGE



METODE
AVERAGE



METODE
LIGHTNESS



METODE
LUMONISITY

HASIL GAMBAR



METODE
LIGHTNESS



METODE
AVERAGE



METODE
LUMONISITY

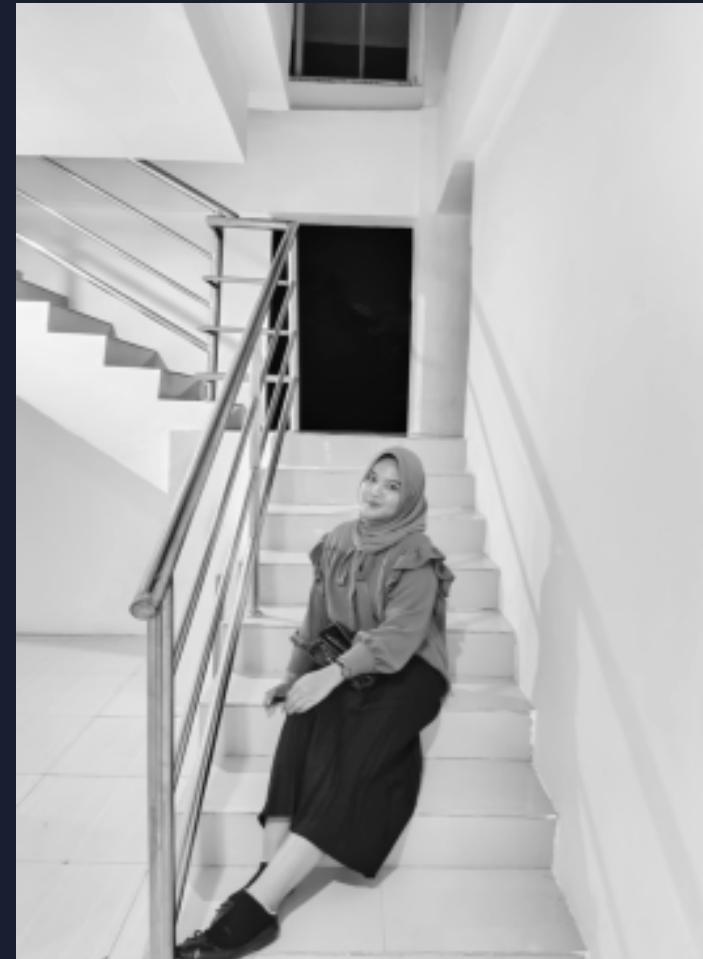


METODE
WEIGHTED AVERAGE

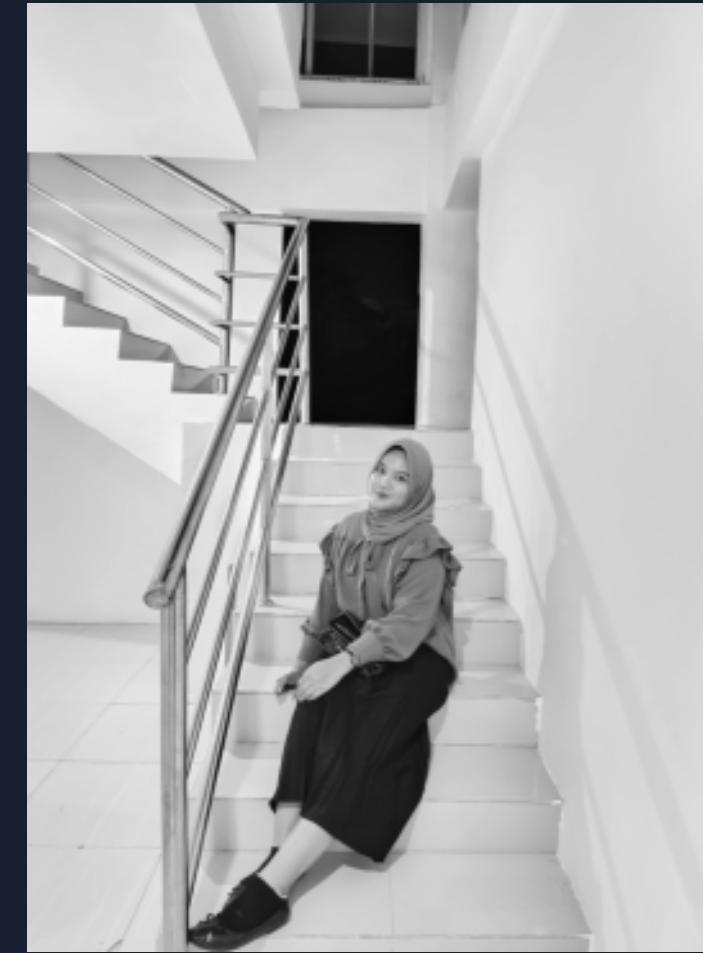
HASIL GAMBAR



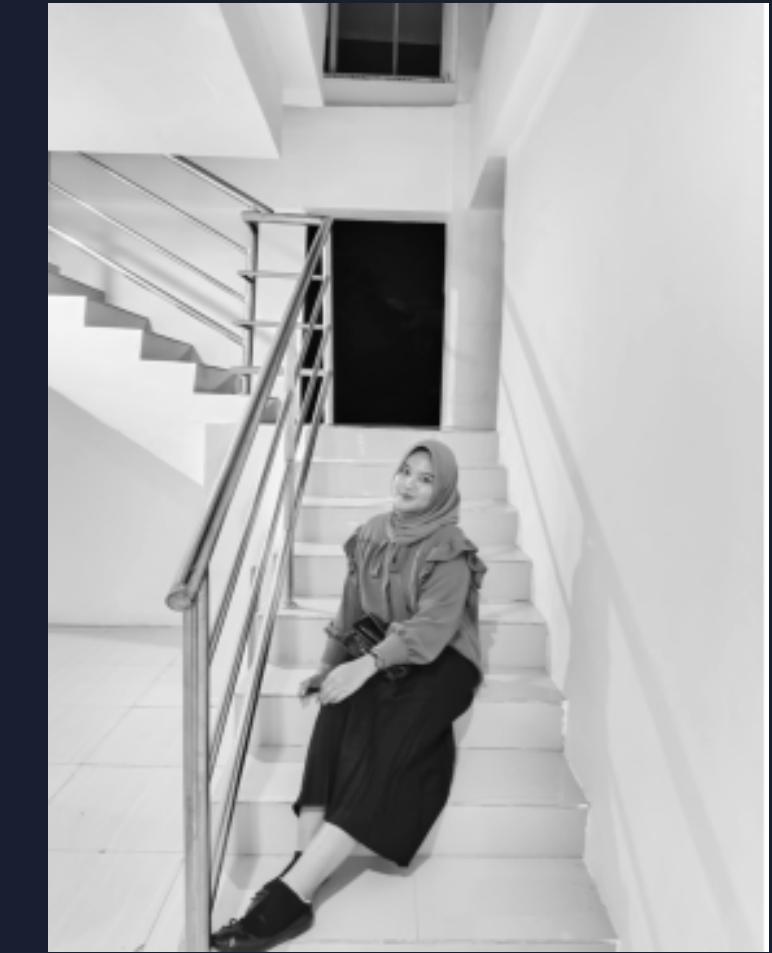
METODE
LIGHTNESS



METODE
AVERAGE



METODE
LUMONISITY



METODE
WEIGHTED AVERAGE

KESIMPULAN

HASIL KESIMPULAN DARI KELOMPOK KAMI BERDASARKAN 3 METODE TERSEBUT, METODE LIGHTNESS YANG JAUH LEBIH BAIK DARI SEGI ASPEK CAHAYA YANG MEMBUATNYA LEBIH UNGGUL DAN NAMPAK LEBIH MENDOMINASI DARI SEGI TAMPILAN.